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AGRICULTURAL NEWS LETTER

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This publication contains information regarding new developments of interest to agriculture based on laboratory and field investigations of the du Pont Company and its subsidiary companies. It also contains published reports and direct contributions of investigators of agricultural experiment stations and other institutions as related to the Company's products and other subjects of agricultural interest.

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"FERMATE" -- NEW DU PONT FUNGICIDE

Since the following paper was presented before the 1942 meeting of the New York State Horticultural Society, the new fungicide, ferric dimethyl dithiocarbamate (mentioned as F-D-D-C for convenience), has been given the trade-mark "Fermate" by Du Pont. Additional experiments and supervised commercial applications this season should lead to greater availability of "Fermate" for general commercial use another year, provided this year's results are favorable and that emergency conditions do not interfere with production.

By Dr. D. H. Palmiter, Hudson Valley Laboratory, Poughkeepsie, and
Dr. J. M. Hamilton, Agricultural Experiment Station, Geneva, N. Y.

Sulfur is the cheapest and most efficient fungicide available for the control of many fruit diseases. However, it has certain limitations, such as: incompatibility with summer oil on apples, inability to give adequate protection against cedar apple rust unless weekly applications are made, inadequate protection against cherry leaf spot, and inability to control brown rot on sweet cherries at concentrations low enough to avoid objectionable residue. For many years the Geneva Experiment Station has been searching for a substitute material which could be used in place of sulfur in cases where the latter was not fully satisfactory. The insoluble copper fungicides were given careful consideration and were found useful to some extent for cherry sprays but in general they were not satisfactory on apples. Meanwhile various organic materials have been compounded by industrial concerns in the hope that they might prove useful as fungicides. During the past few years these organic materials have been tested in the field and laboratory in the search for one that would be practical. Since sulfur is cheap and most organic compounds are expensive, it has been no easy job to find an organic fungicide superior to sulfur yet inexpensive enough to be used commercially.

Some of the most promising organic fungicides have been studied in comparison with sulfur in orchard experiments in the Hudson Valley. While much more study is needed before these materials become generally recommended, the results obtained with at least one of the organic fungicides has been very encouraging and should be of interest to fruit growers.

To avoid confusion in the following brief summary of the 1941 field experiments, data will be presented for only the most promising organic material. It is the most promising because it can be sold at a price comparable with that of sulfur fungicides, it sticks better than most other organics, and is at least twice as toxic as sulfur to the fungus spores concerned. It is a fluffy black powder

Continued on next page

with a long name, ferric dimethyl dithiocarbamate, which we shall refer to as F-D-D-C. In earlier papers it has been known by its test number IN870A3 as supplied by Du Pont.

On McIntosh in a scabby orchard F-D-D-C 2-100 gave good scab control, equal to that of the best dry wettables at 5-100 or flotation paste at 8-100. When used only in the cover sprays at 1-100, F-D-D-C was equally as effective as flotation paste at 6-100 and held scabby fruit to less than one per cent, altho another organic applied at 2-100 to neighboring trees failed to give adequate control. In another test it was used on Baldwins with oil and fixed nicotine without causing injury.

To test its effectiveness in controlling cedar apple rust, five applications (pink, bloom, calyx, 1st, and 2nd cover) of F-D-D-C 1/2-100 were made on Rome trees in comparison with similar applications of micronized sulfur 5-100. The organic material afforded perfect rust control, whereas the sulfur reduced leaf infection only 50 per cent. Where the bloom spray was omitted, F-D-D-C 1/2-100 and 1 1/2-100 afforded 81 and 94 per cent control respectively, whereas sulfur 5-100 reduced infection only 16 per cent. While such low concentrations are enough to hold rust, they could not be expected to hold scab on susceptible varieties. It seems likely that combinations of sulfur and the organic might improve both scab and rust control.

In the search for a preharvest spray to control brown rot on sweet cherries without leaving a visible residue, F-D-D-C has been tested in comparison with other organic materials, copper, and sulfur products. Since laboratory experiments indicated that it was more than twice as toxic as sulfur to the fungus spores, it seemed likely that it could be used at lower concentrations than sulfur and thus avoid leaving an objectionable residue on the fruit. When used just prior to harvest, F-D-D-C 1/2-100 plus 1/2 pint of cottonseed oil spreader left no visible residue and protected the fruit from decay for several days after harvest under conditions favorable for rot development. When applied two weeks before harvest at 1-100 plus cottonseed oil, this organic afforded complete protection against rot altho four inches of rain fell during this period. The fruit had no objectionable residue when picked. Under the same circumstances micronized sulfur 2-100 plus cottonseed oil allowed from 50 to 60 per cent of the fruit to become infected before harvest and the picked fruit showed the typical white sulfur residue to which buyers object.

Since cottonseed oil has been mentioned, it should be pointed out that it has another value besides acting as a spreader and sticker. It also aids in reducing the amount of cracked fruit during rainy periods. The oil film on the leaves and fruit seems to shed at least part of the rain water, thus preventing it from entering the fruit where it would cause cracking.

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NEW USE OF CELLOPHANE SAVING TONS OF STEEL AND TIN

The following discussion will be of special interest not only to research workers in agriculture, but to millions of farmers who grow the crops that go into the new types of packages, and who produce the wood and cotton which supply the cellulose from which cellophane is made.

Adding Protective Film to Fiber Cans Greatly Broadens Use

A transparent film, a thousandth of an inch "thin", is tackling the man-sized job of replacing thousands of tons of steel, tin and rubber in the packaging of foods and other essential items for America and her allies.

The film, of course, is cellophane, the wrapping material which, so to speak, took the pig out of the poke, and permitted customers to see what they were buying without exposing the article to moisture, dust, and germs.

War Production Board orders have sharply curtailed the amount of tin and steel going to can manufacturers, who annually have used 2,000,000 tons of metal in making 17,000,000,000 cans. Use of rubber film for food wrapping has also been banned. In an exhibit in the Annual Packaging Show of the American Management Association, recently held in New York, the Du Pont Company showed how cellophane is being used by the container manufacturers to step up the effectiveness of fiber cans and cartons, greatly broadening their present use and thus releasing the much-needed metals and rubber for war purposes.

At the time of World War I, cellophane was still a luxury item, reserved for such exotic tasks as wrapping bottles of rare perfumes. In the subsequent quarter century, cellophane has become so inexpensive that it is used to protect a thousand and one things, and "wrapped in cellophane" has become a common household expression for freshness and sanitation. Today this water-clear product of the chemical industry and the forest -- wood pulp is a principal ingredient -- enters an entirely new phase in its career, in which eye-appeal is being subordinated to strictly utilitarian qualifications - its ability to make other packaging materials moisture-proof, water-proof, grease-proof and poison-gas-proof.

A War Production Board Limitation Order prohibits the use of cellophane as a decoration and in such less-essential applications as the wrapping of razor blades, soaps, garments, hardware, etc. But the Government evidently has no intention of limiting the use of this product in the protection and preservation of essential products of human consumption, such as food and tobacco, which require protective packaging. The spoilage and shrinkage of improperly protected foodstuffs would be a serious waste, particularly in time of war, and dried out tobacco certainly takes the pleasure out of smoking.

Continued on next page

Ten Years of Research and Experiment

Ten years of research and experiment have brought cellophane to the point where it is now able to step into many of the jobs left open by the scarcity of metals.

One of the most important of the new cellophane applications is in the fiber "can," where it adds its protective values and strength when laminated to board. Some of these resemble the familiar cylindrical ice-cream container, in others the metal can body is replaced by laminated board and cellophane, with the metal ends attached in the usual way, saving 60 to 80% of the metal. Already hundreds of thousands of these types of packages have been used to pack lard and baking powder. Experiments have shown that many other products now packed in metal containers, such as syrups and greases, powdered foods, coffee, and various oils may also be packaged in this manner. Even concentrated fruit juices have kept fresh for months in such cardboard, cellophane-lined packages.

Another widely used form of package might be termed the "bag-in-box," in which a leak-proof cellophane bag is formed inside a carton - or fabricated as an integral part of a carton - and tightly sealed merely by heat. Vegetable shortening and quick-frozen foods are among the foods being packaged in this manner.

The Many Uses of Cellophane in Packaging Food

Finally, of course, cellophane is also doing a big protective job all by itself in its familiar transparent bag or wrapping, without additional packaging materials. All sorts of foods, such as breakfast cereals, crackers, bread, bacon, cake, cheese, dehydrated soups and vegetables are being sold in this economical, air-tight and moisture-proof package.

Curiously enough, when cellophane is added to paperboard, as in the cardboard "can" or the "bag-in-box" package, its use is exactly similar, both in principle and actual weight, to tin added to steel in the form of "tin plate." So cellophane is replacing tin pound for pound and is enabling cardboard to replace steel many times its own weight.

A study by a leading producer of quick-frozen foods provides a good example of how board and cellophane packages conserve important materials. It reveals that packing a million pounds of frozen peas by this method instead of canning them in standard metal cans saves 265,158 pounds of sheet steel and 4,138 pounds of tin. The canning job would require also paper labels and shipping cases, bringing the total packaging weight up to 404,189 pounds. The quick-freezing method uses only 7,147 pounds of cellophane, 9,264 pounds of waxed paper, 87,350 pounds of cartons and 28,545 pounds of shipping cases, making a total weight of 132,306 pounds. Thus the weight of the materials used in the frozen package is only a third that in the can method. Furthermore, in this day when shipping space is at a premium, it is significant that only 31 freight cars would be required to transport the rectangular frozen food cartons as compared to 64 for the round cans.

Continued on next page

Steel and Tin Released for Engines of War

The steel conserved by the use of the non-metal containers is, of course, freed for ships, guns, tanks, airplane motors, war production machinery and countless other vital items. A large part of tin saved goes into solder and bearing metals, the demand for which is obviously tremendous in our mechanized fighting forces.

Another important saving achieved by cellophane is in its conservation of metal through its substitution for foil, which has been used in great quantities in wrapping processed cheese. Until fairly recently the 325,000,000 pounds of processed cheese produced annually in this country used 4,600,000 pounds of foil. Air-tight, moisture-proof film does this job effectively, preventing the cheese from becoming rancid and moldy and dry.

Recent restriction of foil in packaging cigarettes will place an additional burden upon cellophane, which already was being used as an outside wrapper for cigarettes. The tobacco industry has been using 60,000,000 pounds of metal annually in the form of foil, all of which will soon be diverted to purposes more essential to the war effort because the cellophane wrapper is on the job to protect the freshness of the tobacco.

A notable advantage of cellophane over metal packages and foils is that it is made from a constantly renewing source - wood - while the world's supply of metals is limited. And because of its extreme thinness, cellophane covers much greater area per pound than do other wrappings of equal strength.

This tough, thin transparent film is celebrating its 50th anniversary this year - if one goes back to the fundamental laboratory work of the English chemists, Charles F. Cross and Edward J. Bevan, as the starting point. It remained for a Swiss, Jacques E. Brandenberger, however, to develop and commercialize the material. By 1912 he had perfected his machinery for its production and had given it the name, "cellophane," after the first syllable of "cellulose" and the Greek word "phaneros," for clarity.

NOTE: Pictures of some of the new-type cellophane packages will be sent upon request.

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MOLD IN FOOD RETARDED THROUGH CHEMICAL RESEARCH

By Dr. F. W. Miller, Jr.
Food Research Laboratory
Du Pont Ammonia Department
Wilmington, Delaware

With food conservation now a matter of national necessity, today's housekeeper is on the alert to make full use of all the provisions she buys. In spite of careful planning, however, she sometimes has to throw away food because it is moldy. A half-eaten loaf of bread or cake, a left-over dish of fruit, or even wrapped and refrigerated cheese, mysteriously sprouts an unsightly growth and becomes distasteful and malodorous. The grocer is not to blame -- nor the baker, who until recently had little control over mold. Mold is everywhere, it floats along on dust particles in the air. Annual losses of food from this cause are said to amount to at least $100,000,000.

But scientists have been studying the minute parasitic growths or fungi which we know as mold, and have already made headway in reducing the appalling waste. At the Food Research Laboratory in Wilmington, Delaware, a unit of the Du Pont Experimental Station, chemists explore the lives and habits of these tiny plants under a microscope, seeking means to destroy them or at least retard their growth.

It was discovered that introducing propionates into bread and other foods would delay the development of mold spores beyond the time when the food would be useless from other causes. These substances are naturally present in many articles of diet--such as butter, cheese, cream, vinegar--but generally in such small quantities that their effect on mold is negligible.

"Mycoban" Used In Baking Industry

When chemists learned to produce propionates synthetically, new possibilities for food conservation were opened. Tests were conducted in the laboratory kitchen on bread baked with scientific precision. Results pointed to the value of the retardant for food industries, and it was made commercially available under the name "Mycoban" mold and rope inhibitor, finding immediate acceptance in the baking industry. In 1941 more than 1,750,000,000 loaves of bread were protected against mold. During 1942, the number is expected to reach nearly two billion. More than 1,600 bakers throughout the country are now using the retardant to help conserve food resources.

The retardant is in the form of a white powder, which is introduced into bread dough before baking. The yeasts needed for leavening are unaffected by the retardant but the amount of it that remains in the loaf after baking is sufficient to extend the mold-free life of bread up to seven or eight days. The taste, appearance, and nutritional value of the food is not changed by the treatment.

The housekeeper's trouble with mold, annoying as it may be, is small when compared to that faced by the industries that send food to her table. Bakers find

Continued on next page

their bread moldy despite the most sterile conditions. Mold spores are commonly present in the air, and may be found in the cleanest bakeries and food factories, where they settle on food. While the heat of baking kills them, others are waiting to drop on a newly baked loaf and begin the process all over again. Like other vegetable plants, molds must obtain nutriment, and bread is their piece de resistance. They propagate rapidly and profusely on this diet. Molds have a particular fondness for whole wheat and rye breads and grow much faster on this food.

Moisture and warmth favor the growth of mold, accounting for a greater nuisance in summer. This explains, too, why wrapped bread may get moldy, since the wrapping helps to prevent moisture-loss. With the soft bread of today, the problem is worse then it used to be. Formerly much of the bread sold had a hard crust, inhospitable to mold spores.

"Rope" Disease In Bread Allayed

"Rope" is another bread disease which has been allayed by the inhibiting agent. It occurs mostly in warm climates, particularly where the humidity is high. "Rope" is caused by bacteria which infect a loaf, breaking it down into a pasty substance, which becomes stringy or "ropey" when drawn out. This disease is difficult to control, and bakers rarely know that the bread is infected until the customer appears in a fighting mood, complaining of a contaminated loaf. The bacillus enters the dough before the baking process, and a hot oven has practically no effect. The bacillus begins its work as soon as the bread cools. Even in as little as 24 hours a cantaloupe odor may develop, if the bread is moist and kept in a warm place. In three or four days the loaf may go completely bad. Like mold, "rope" spores grow better in dark breads.

Cakes and pies are highly susceptible to mold, and bakeries formerly sustained heavy losses in these articles. Treatment with propionates is now well established as a definite retardant. Its value was strikingly demonstrated when a large bakery, which ordinarily uses the retardant in its fruit cakes, omitted it from one day's production. About 7,000 cakes were returned because of mold.

Experiments On Other Foods and Tobacco Underway

Experiments on other foods are going forward in Du Pont's Food Research Laboratories--cheese, butter, dried fruits, jams, dried fish, and berries. Tobacco is also under the microscope. In cheese and butter, the work has progressed to a point where mold retardants are now widely used. It is estimated that over 75,000,000 pounds of butter will be treated this year against losses from mold, and millions of pounds of cheese will be saved from spoilage.

Mold in cheese may be an asset in such varieties as Roquefort, but in most household types it is a distinct liability. Cream cheese and cottage cheese are the most perishable kinds, sometimes showing mold a day or so after leaving the store. With propionates, the onset of mold can be retarded definitely and substantially. Delays equivalent to from thirty to forty days under normal

Continued on next page

conditions are obtained merely by dipping the cut cheese in a solution, followed by packaging in close-fitting moisture-proof wrappers.

Impregnated Parchment Paper for Wrapping Butter Gives Good Results

Favorable results from wrapping butter in specially impregnated parchment paper indicate a twenty per cent increase of this practice during 1942. Mold in butter affects the producer and jobber primarily, as the housewife rarely sees moldy butter. She may occasionally run into it unknowingly when she discards butter with an off flavor, commonly described as cheesy. The taint may be due to mold growth, not developed sufficiently to become visible. It is often due to the same organism which contributes to the flavor of Roquefort cheese. Unsalted butter, which molds more quickly than the salted kind, is particularly in need of protection.

In baked goods and dairy products, mold-protection has now made such strides that women may effect a worthwhile amount of food conservation by demanding from the grocer a brand in which the retardant is used.

NOTE: The foregoing was prepared for publication in "Forecast" Magazine for June, 1942.

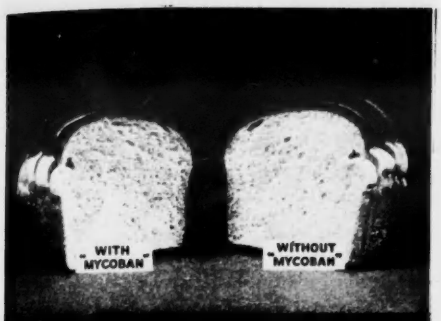
RESEARCH DEVELOPS FACT THAT JAPANESE BEETLES PREFER YELLOW

Federal entomologists report that Japanese beetle traps painted yellow are definitely superior to those painted green and white, aluminum, white, light yellow, light blue, dark blue, pink, red, orange, reddish orange, and various shades of green.

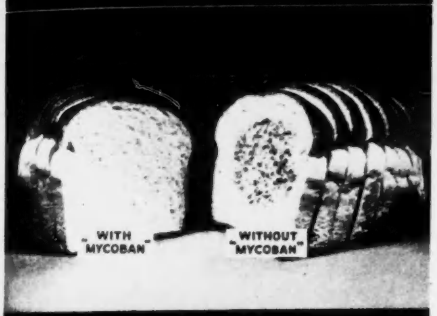
In the experiment, the yellow trap captured 50.8 per cent more beetles than the green and white standard trap commonly used. Addition of yellow to other pigments always enhanced their effectiveness. All of the paints used in the experiment, except aluminum, were supplied by cooperating Du Pont chemists, who point out that while traps will not fully protect crops, they help. Maryland entomologists, for instance, in one season caught more than 1,737 barrels or 104 tons of beetles in about 100,000 traps.

While yellow paint may be difficult to obtain because of shortages of certain pigments used in its manufacture, some is still available on store shelves and in farm workshops. Then, too, some stores still have in stock traps painted yellow before the shortage of yellow paint developed.

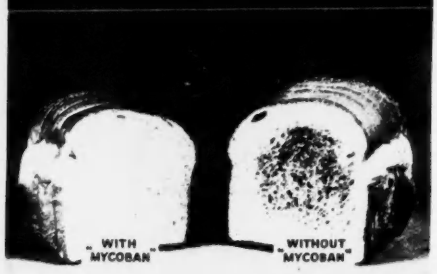
"MYCOBAN" IN BREAD



FIRST DAY



THIRD DAY



FIFTH DAY

SIXTH DAY

R O P E (Above)

The organism which causes rope produces three changes in the crumb of bread: (1) odor resembling ripe cantaloupe, (2) a darker color, and (3) a breakdown of the bread to a sticky mass which can be drawn out in strings, as shown in the above picture. In case of a light infection, only the unusual odor may develop. "Mycoban" definitely retards development of rope.

M O L D (At Left)

In the four pictures in the column at the left of this page, the bread on the left contains 3½ ounces of "Mycoban" per 100 pounds of flour. The loaf at the right is made of the same dough, but contains no "Mycoban." Note heavy mold development. Both were stored at 80°F. and 85° humidity for six days.

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TREATING FENCE POSTS WITH CHROMATED ZINC CHLORIDE

The following, based on information developed by Clemson College is applicable throughout the country. Mr. Nettles points out that thousands of farmers in South Carolina do not have durable wood for posts. Hence, the interest in a simple farm method of preserving posts.

By W. C. Nettles
Extension Entomologist
Clemson College, S. C.

Interest in preserving woods with water-soluble preservatives, such as chromated zinc chloride, in South Carolina began during the fall of 1937. An invitation was received to visit the Forest Experiment Station at Asheville, North Carolina, where some of this work was in progress. Various methods of treating standing trees and also trees having the foliage intact had been developed, and this gave promise of a means of preserving fence posts against insects and decays.

Wood Preservation - A Pest Control Problem

Wood preservation is essentially a pest control problem. The primary agency responsible for the disintegration of pine posts is subterranean termites. The agencies of fungi and decays also enter. Data developed in one of the Clemson tests show that, on the untreated post, termites have caused its disintegration within two years, whereas the post treated with chromated zinc chloride is perfectly sound. These two posts were cut the same day and placed in the ground the same day, the only difference being that one was treated and the other was not. Demonstrations of this type have been placed in every county in South Carolina, and results are now apparent. Just how long the posts treated with water-soluble preservatives by the trough method will last is not known. Only time will tell. However, where this preservative has been used on green posts by other methods, the length of life has been increased to considerably more than ten years.

How to Treat

The following outline is given to show the procedure which was used in treating by the trough method and by which impregnation was secured.

Essential Steps. - 1. See paragraph on How to Prepare and Compute the Amount of Solution. 2. Cut out 6-foot posts of green loblolly, short leaf, or slash pine. 3. Immediately immerse top end in trough for 3 hours. 4. Saw off 1-inch disk to remove resinous material from basal end. 5. Place basal end of posts in solution. 6. As soon as solution is absorbed (24 to 48 hours) remove post from trough and reverse ends. 7. Stand up for from 2 to 4 weeks, and preferably until throughly seasoned.

Continued on next page

Materials and Equipment. - 1. Green pine posts, freshly cut. 2. Chromated zinc chloride. 3. Trough or half of wooden barrel. 4. Container for stock solution, either wooden, glass, or earthenware.

How to Prepare and Compute Amount of Solution. - Dissolve chemical at rate of 2 pounds to each gallon of water. Allow solution to soak into posts at rate of three-quarters pound to each cubic foot of wood. Table 1 will prove helpful in computing amounts for a given lot of posts.

Table 1. - Amount to treat 6-foot post, three-fourths pound per cubic foot

Diameter, inches	Cubic feet	Approximate amount per post, pints	Approximate amount per post, ounces	Cost in cents at 8 cents per pound
3	0.29	1.00	3.5	2.0
4	0.52	1.75	7.0	3.5
5	0.81	2.50	9.8	5.0
6	1.10	3.50	14.1	7.0

Example. - Assume a trough holding 12 posts of following average diameters: four with 6-inch diameters; four with 5-inch diameters; two with 4-inch diameters; two with 3-inch diameters; table 2 indicates amount of solution required.

Table 2. - Amounts of solution required to treat fence posts of various diameters.

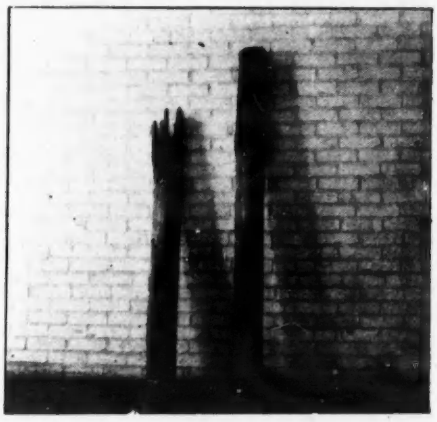
Number of posts	Average diameters	Pints per post	Total pints solution
4	6	3.50	14.0
4	5	2.50	10.0
2	4	1.75	3.5
2	3	1.00	2.0
			29.5

The South Carolina Extension Service is demonstrating the methods of treatment developed. Records will be kept on the results of these demonstrations, and from time to time additional reports on the length of life of these posts will be made available to South Carolina farmers and to interested scientific workers. Experience to date indicates that: (1) the farmer will use only simple treatment, such as the trough method; (2) that chromated zinc chloride is many many times less corrosive than bluestone; and (3) that posts treated by the trough method are still sound after about four years.

Editor's Note: Due to War Production Board Chromium Order M-18-B prohibiting the use of chromium in the manufacture of wood preservatives for service requirements bearing priority ratings below A-10, Du Pont is temporarily unable to furnish Chromated Zinc Chloride for the preservative treatment of fence posts. Under the circumstances the use of unaltered zinc chloride is recommended, a treatment which may be expected to render long uninterrupted service.

TREATING FENCE POSTS

Left: Large-scale treatment of green posts in wooden troughs. Barrels may be used for a few posts.



Right: These two posts were in the ground two years. Left, untreated.

These pictures are reproduced from a bulletin on "Treating Fence Posts" by W. C. Nettles, Extension Entomologist, Clemson College, S. C. The post on the right in the lower picture was treated with chromated zinc chloride.

Agricultural News Letter (Du Pont)
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PHENOTHIAZINE -- "THE NEW CHEMICAL WITH A FUTURE"

Phenothiazine today is receiving attention as "the find of the century." In the following statement prepared for publication in the "Agricultural Leaders Digest," Dr. Jardine says that if phenothiazine meets expectations, it will become "one of the farmer's most important chemical aids." Dr. Jardine discusses the work of scientists in the United States Department of Agriculture in studying known and potential uses of this chemical marvel.

By Dr. James T. Jardine
Director of Research
U. S. Department of Agriculture
Washington, D. C.

Seldom has any one chemical promised to be as valuable in as many fields as phenothiazine. This versatile product kills many insect pests that infest plants, as well as some of the organisms that cause fungus diseases of plants. It removes more different kinds of worms successfully from farm animals than any other chemical now known. It even kills bacteria responsible for certain serious infections of man. Phenothiazine, by itself and in various combinations, is undergoing critical tests in the U. S. Department of Agriculture. If it meets the expectations of Department scientists, it eventually will become one of the farmer's most important chemical aids.

The first Department scientist to see a big future for phenothiazine was L. E. Smith, a chemist in the Bureau of Entomology and Plant Quarantine, who was searching for new materials toxic to insects but not to man. From its chemical make-up, phenothiazine seemed to be such a material. The chemists, therefore, made up several batches and sent them on to the entomologists for tests on insects. These tests showed that phenothiazine is toxic to some insects, including mosquito larvae, the codling moth, the Mexican bean beetle, and the grape berry moth, but not to others, including the boll weevil and the tobacco hornworm. Altho apparently not poisonous to the Japanese beetle, it has a definite repellent effect on this beetle.

Pending the results of field tests now under way to determine the practicability of substituting phenothiazine for the arsenicals now commonly used to control codling moth larvae and other insect pests, the Department cannot recommend phenothiazine to farmers as an insecticide.

Dr. M. C. Goldsworthy and E. L. Green, of the Bureau of Plant Industry, discovered the new chemical's fungicidal property. Phenothiazine, as such, is not a fungicide. On exposure to strong light, however, it changes to a form known as phenothiazone, which is toxic to certain fungi. The possibility of developing a residue that would have both insecticidal and fungicidal properties led

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the plant pathologists to their present efforts to work out a method of spraying phenothiazine on fruit trees in such a way that some of it will be converted into the fungi-killing form, while the rest retains its toxicity to insects. Further experiments are necessary to determine, if possible, how to make this spray do double duty.

Dr. Paul D. Harwood and his associates, of the Bureau of Animal Industry, found treatment with phenothiazine an effective and safe way to keep sheep from losing weight, and even dying, as a result of attacks by worms, and to protect swine from injury by certain worms. Sheep received their doses in the form of large capsules administered by a balling gun. Pigs received theirs mixed with their feed. Later it developed that phenothiazine is a remedy for strongles--internal parasites that cause an anemia and debility, and may cause acute colic and death, in horses--and for many of the worms that undermine the health of calves.

As a result of a great number of experiments by the U. S. Department of Agriculture, thousands of pounds of phenothiazine are being manufactured and sold annually for the removal of parasites affecting horses, mules, cattle, sheep, goats, swine, and poultry. To insure proper dosages and treatment, the Department warns, phenothiazine should be administered only by, or under the direction of, a veterinarian.

In making tests to check the hazard of phenothiazine spray residues to human health--necessary before any insecticide can be recommended by the Department--Dr. Floyd DeEds, of the Bureau of Agricultural Chemistry and Engineering, noticed a pinkish tinge in the hair of the white rats to which he was feeding the new chemical experimentally. He traced this discoloration to the animal's urine, which was red. Further tests showed that this red urine was completely sterile. Still further tests confirmed the assumption that phenothiazine kills bacteria. The new bactericide is being tested clinically on human beings suffering from infections of the urinary tract in order to ascertain the efficacy and safety of the compound. Pending the reports of hundreds of case histories, phenothiazine cannot be recommended for use as a urinary antiseptic.

NOTE: The March-April issue of the "Agricultural News Letter" stated that a review of the work of McCulloch and Nicholson on phenothiazine as a control of cecal worms in poultry would be included in this (May-June) issue. Publication of this paper has been postponed until the July-August issue.

Agricultural News Letter (Du Pont)
Vol. 10, No. 3, May-June 1942

PAINT AND VARNISH AS FACTORS IN INTERIOR COLOR FOR EASY SEEING

While the applications discussed below are primarily for teachers and school authorities, the principles apply generally. The statements embody research results of the Distinguished Foundation of Optometry, and are taken, by permission, from that Foundation's copyrighted publication "Essentials of Visual Efficiency." Further information may be obtained from Dr. Clinton R. Padelford, 56 North Main Street, Fall River, Massachusetts.

Light from windows and lamps reaches the walls, ceilings, and floor of any given room. In turn it is re-reflected between them, and from all of them it is reflected upon the working plane. This reflecting process gives the room a greatly increased illumination value above that which would occur from the windows or lamps alone. The reflection factor of the ceiling, wall, and floor finishes thus plays a dominant part in the visual efficiency of the workers in the room.

Steady fixation upon a given task is fatiguing. Eyes are more comfortable when their direction of gaze changes frequently. Hence, it is both natural and restful to glance up from the book or other work from time to time. If the surroundings are dark, the effect of such glances will be to require the readjustment of the eyes for a different light intensity; and a second re-adjustment when the eyes again return to work. These adjustments are fatiguing. They also require time, and a loss of efficiency results.

Bright surroundings improve visual efficiency because the visual adaptations are more quickly and easily made. Eye comfort is thus increased, and the student is more alert and cheerful.

Reflection Factors of Various Paints

Taking the reflection factor of top-grade white finish as 98%, that of inside flat white paint is 80%, outside white paint 72%, light ivory 70%, light buff 60%, light gray 48%, medium green 19%, and red 12%. The reflection factor of natural wood finishes is similar to that of the paint pigment of corresponding color.

"Reflection factor" is not the same thing as "shine". Black enamel with a very high gloss has about one-tenth of the reflection factor of flat white paint. Shine and gloss are to be avoided wherever efficient seeing is desired.

Even if eye fatigue were not considered, it is inadvisable to compel the eyes to change their gaze too rapidly from one brightness to another greatly different. While avoidance of large differences in brightness produces increased efficiency and decreased fatigue, the cheerfulness and comfort which well-designed surroundings give is an important added contribution.

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An Illustrative Case

An illustrative case is that of a room which was formerly finished in mahogany woodwork with walls of low reflecting value. It was not an exceptional situation. In refinishing the woodwork, it was painted a stippled peach color with a reflection factor of 68%, a gain of 56% over the former dark mahogany. The walls were refinished in a stippled orange-yellow color with a reflection factor of 74%, an increase of 69% over the former finish. The ceiling was made flat white. Everyone was delighted with the change. All of the unpleasantness caused by extreme changes in brightness have disappeared. Where formerly six thousand watts of lighting were used, giving four foot-candles of light upon the working plane, the wattage has been reduced to nine hundred, a reduction of 81% in current consumption. Yet the light upon the working plane actually increased to ten foot-candles. This represents an increase of 150% in visual efficiency with but 19% of the former lamp load.

This is not an outstanding example of possibilities in the field of interior decoration. Thousands of other work places are still tremendously inefficient and wasteful in this respect. Untold schoolrooms and public buildings have dark walls and woodwork so that they will not show the dirt. But the increased visual efficiency, comfort, pleasure and economy of properly decorated surroundings will repay any expense involved.

Suggested Schoolroom Color Schemes

The exposure of a schoolroom should be considered when selecting its decorative scheme. North rooms, or rooms with north windows, which receive but little if any direct sunlight, should be decorated in warm hues, while the rooms with southern exposure should have the cooler tints.

A sample suggestion for a schoolroom with south windows would be as follows:

Light olive-green for the dado, door and window trim, legs of tables and desks;
Darker olive-green for desk and table tops, and work surfaces;
Very light tint of sea-green (aquamarine) for the upper walls;
A near white tint for the ceiling, such as a very faint blue-white.

For a schoolroom with north lighting the following would be suitable:

Light yellow-green for the dado, door and window trim, legs of tables and desks;
Medium tan or light brown for desk and table tops, and work surfaces;
Very light tint of yellow-green or light buff (yellow-brown) for the upper walls;
A very light ivory tint for the ceiling.

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All tints should be soft, light in hue and free from any gloss or shine. Avoid reds, yellows, or pronounced blues and greens. Ceilings may be flat white if desired, but walls should never be white in color. The reflection factor of ceilings should not be less than 80%. The sidewalls should reflect from 50% to 60% of the light reaching them.

Desk Top Finish

Teachers and others like to see things spick and span; they take pleasure in furnishings that shine with neatness. This attitude must be modified. "Shine" is a visual hazard; it has no place on any surface where critical or long continued seeing is done. Countless school desks are annually given a coat of varnish in preparation for the coming school year. It is not advised.

The use of plate glass desk or table tops is the extreme of folly, for their surfaces promote reflections and glare which result in eye fatigue. The same rule applies to highly polished floors or any object which is more or less constantly in the line of vision.

Bearing these principles in mind anyone may arrange desk equipment in such a manner that increased comfort and less fatigue will result.

The ideal desk surface is probably a light green shade of inlaid linoleum. No higher gloss than "matt" or "eggshell" should be tolerated. A light brown or light tan color is not objectionable.

A substitute would be to lacquer desk tops with light green or light tan tones, thus leaving a hard, smooth, good wearing surface free from gloss or shine.

RESEARCH DEVELOPS CASTOR OIL BASE FOR HOUSEHOLD AND CATTLE SPRAYS

Science has discovered and developed a castor oil base to replace in part the pyrethrum used in household and cattle sprays. Du Pont chemists, after nearly 10 years of experiments, found that a base, derived from the castor bean crop, would do the job better than any other. It is IN-930, known chemically as isobutyl undecylenamide, which has already replaced millions of pounds of imported pyrethrum in leading insecticides. In addition to superior killing properties of the finished spray, this synthetic product has the advantage of being a stable compound that can be manufactured according to specifications. And, in combination with pyrethrum, it is satisfactory from the standpoint of safety to humans and domestic animals, lack of corrosive or staining characteristics and of objectionable odor.

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"SCRIPTOSCOPE" PROJECTS WRITING ONTO A SCREEN

The "Scriptoscope", described below, was invented and patented by David Katz, of the Patent Division of the of Legal Department of the Du Pont Company. Commercial production will depend on availability of raw materials. A description of the invention is included here because of its possible interest to agricultural teachers, lecturers, and others who present data developed by agricultural research. Pictures are available upon request.

The "Scriptoscope," a class-room lecture desk which allows one to write on cellophane stretched over a plano-convex lens on the desk top and have his writings projected onto a large screen on the front of the desk, may change future methods of visual education.

Invented by David Katz of Wilmington, Delaware, this desk enables a teacher or lecturer to illustrate his discourses without turning his face from the audience. Sitting at his desk, he draws his sketches or diagrams with a wax pencil on rolls of cellophane stretched across a 10-inch lens.

A beam of light from above the desk is directed through the plano-convex lens; a system of lenses and mirrors intercepts this beam and projects it on the screen.

May Be Used In Illuminated Room or Daylight

The screen, about 24 by 30 inches, may be built above or below the desk top. It may be used in a well-illuminated room or in daylight, provided it is shielded from direct rays of the sun.

The rolls of cellophane give a permanent record of a lecture, and may be used for reviewing without again rewriting all the material. Pre-fabricated diagrams and sketches, especially complex ones, may be drawn before a lecture and slipped under the cellophane; and the lecturer may write what he wants on the cellophane without spoiling the diagram.

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CONTROL OF X DISEASE OF PEACHES BY KILLING CHOKECHERRY WEED WITH AMMONIUM SULFAMATE

The virus malady of peach trees called X disease is spread by the wild chokecherry bush or weed. Scientists say that the host chokecherries growing within 500 feet of a peach orchard must be destroyed. The following, taken from a paper delivered before the New York Horticultural Society's 1942 convention, recommends the use of ammonium sulfamate. Du Pont Weed Killer is based on this new industrial chemical.

By Dr. E. M. Hildebrand
Cornell University
and Dr. D. H. Palmiter
Poughkeepsie Laboratory,
New York Agricultural
Experiment Station

Five years ago when the X or Yellow-Red disease was first found in Hudson Valley peach orchards, it seemed far removed from peach growing in western New York. However, the presence of X disease in the Hudson Valley only about four years after its original discovery in Connecticut left no doubt about its ability to move across state boundaries on the widely occurring chokecherry weed host and gave warning of what was to happen in the future. Its rapid migration on the chokecherry into the vicinity of peach orchards, and the relatively short period of about three years required to make these orchards practically worthless, were a challenge to immediate and concerted action if we were to cope with this new disease menace.

Western X Disease

There is a similar new disease of the peach in the western states of California, Colorado, Idaho, Oregon, Utah and Washington. While similar in many respects and now being called the Western X or Yellow-Red disease, no one knows as yet the connection or relationship between these diseases. The fact that both diseases render peach trees useless for commercial purposes is enough to make us want to take the necessary measures to eliminate the hazards of both as soon as possible.

Orchard Control of X Disease

The control of X disease is the primary concern of both investigator and fruit grower. To be sound, control measures must be based on a thorough understanding of the characteristics and peculiarities of the disease and its casual agent, the virus. Undoubtedly this disease is spread by an insect, but no one has been able to find the insect or prove this point as yet. That the insect vector prefers to feed on the chokecherry is obvious because it is on this plant that the disease spreads so rapidly and so far. An extremely important point to bear

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in mind is that the disease will spread to peach trees only when diseased chokecherries are close by or within a distance of about 200 feet. The usual sequence of events is a diseased chokecherry plant at the edge of a peach orchard one year and diseased peaches the following year. The X disease, as we know it in the East, always spreads from chokecherry to peach. No case is known of spreads from peach to peach. Upon the removal of diseased chokecherries for a distance of 200 or more feet from an orchard, further spread between peach trees ceases.

How To Eradicate Chokecherries

To eradicate chokecherries it is necessary to kill both tops and roots because this plant spreads both by seeds and roots. Cutting and burning off the tops will not kill the roots which soon send up new stems. Grubbing is very laborious. Using the fence row for a driveway after first removing the brush has been tried. Although the affected chokecherry plants fail to bear seed and commonly die from the disease after about three years, the chokecherry menace is not necessarily eliminated because birds freely disseminate the seed from healthy plants. The easiest way to eradicate the chokecherry is with a special chemical spray that is absorbed in sufficient quantity by the plant to kill both the tops and roots. After years of tests with various herbicides in Connecticut, New York and elsewhere, the sodium chlorate spray, prepared by dissolving 3/4 pounds of the salt into a gallon of water, has given the most consistent and effective results. A single application during July has proven more effective than applications either earlier or later in the season. A thorough wetting of the leaves and stems is all that is required.

A New Herbicide

During the past summer a new herbicide, called ammonium sulfamate, when tested alongside sodium chlorate and at the same concentration, gave equal if not superior results as a killer of fence-row weeds and shurbs. Parallel tests were conducted by Palmiter in the Hudson Valley. This chemical besides killing the chokecherry seems to kill a wider range of other plants than sodium chlorate. It has the advantage also of not being a fire hazard. Whether or not ammonium sulfamate will be available next summer also is not known with certainty at present. So it would seem advisable for growers to promptly make their wants known to the dealers.

The use of either sodium chlorate or ammonium sulfamate at the rate of 3/4 pound of salt to a gallon of water makes an expensive spray, but not too expensive when it is considered that only one thorough application is needed. When the shrubs range up to a height of about 4 feet, one galllon of the spray mixture will cover an area of about 10 feet square or 100 square feet. Taller shrubs will require additional spray up to 2 gallons for the same area. Cutting off the tops of chokecherry plants so as to get succulent new growth for spraying and with the idea of reducing the quantity of spray needed is not a good practice, because these herbicides appear to work more effectively on woody than on succulent growth. It seems that succulent growth is killed too fast for the chemical to penetrate in any quantity. In other words, these chemicals seem

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to be geared to the woody type of growth where, because of slower killing, time is afforded for penetration into both stem and root.

Conclusion

If peach growers are willing: (1) to buy trees from reliable nurseries, (2) to take the proper precautions in isolating young plantings for a minimum recommended distance of 500 feet from chokecherries, and (3) to destroy all chokecherries within 500 feet of bearing peach orchards, X disease as we know it in the East will cease to be a menace to peach culture.

Wilting chokecherry bush showing effects of Du Pont Weed Killer soon after spraying.

The chokecherry grows in bush form and is seldom more than 15 feet high. Cutting it down does no good. It sprouts back quickly. It must be killed to control the X disease, which causes the leaves of the peach tree to become reddish-yellow and spotted. These spots drop out, causing a ragged appearance. Many of the leaves of the peach tree drop off, leaving the branches bare.

Dr. E. M. Stoddard, pathologist, Connecticut Experiment Station, New Haven, like Drs. Hildebrand and Palmiter, urges the destruction of the chokecherry "to as great a distance as possible from the orchard." Dr. Stoddard adds that he considers 500 feet a safe distance, but "it is very desirable and necessary to clean up the chokecherry even if it can be done only a distance of 100 feet from the peach trees." He also agrees that there is little if any spread of the disease from peach to peach, and that the spread of infection comes entirely from the chokecherry. He considers eradication of the chokecherry "much more important than removing diseased peach trees from the orchard."